Universal Design for Learning and Broadband RI (BBRI):

Training Digital Literacy Instructors to Effectively Reach ALL Adult Learners

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Abstract

The development of skills and confidence to access and use the Internet is necessary to every citizen's full participation in today's society, however many adults continue to be digitally disconnected. Individuals with disabilities, seniors, Black and Hispanic citizens, and those with less education are disproportionately less likely use computers or the Internet. Broadband Rhode Island was established to improve and expand statewide broadband access and use. BBRI's Digital Literacy (DL) Program, with its accessible curriculum, innovative instructor training and diverse on-line resources, is working to expand adult digital literacy in RI. Key to the program is the integration of Universal Design for Learning principles and strategies in both curriculum and training. Background on the DL Instructor training program, including curriculum development, implementation, and outcomes, are presented.

Broadband RI Initiative and Digital Literacy Project: Background and Rationale

Think about living in a world that uses browsers, URLs, SPAM, and mice, and having no way to connect with or understand them. This is the frustration facing so many of our citizens who have had no opportunity to learn to use a computer or the Internet. How would you explain what a browser is to a brand new digital learner? Digital literacy is critical for full participation in today's society, but too many U.S. citizens are truly *digitally disconnected.*

In 2010, Broadband Rhode Island (BBRI) began its efforts to improve and expand broadband access and use throughout the State of Rhode Island. U.S. Department of Commerce statistics for 2011 indicated that across the U.S., general Internet use in homes was greatly dependent upon an individuals' race, ethnicity, and degree of education. White and Asian families' level of Internet use was at 68-69% respectively, but Hispanic and Black families' level of Internet use was much lower, at 48-50% respectively. The same studies showed that 84% of college graduates regularly used the Internet, while just 30% of persons with at least some high school education were Internet users (U.S. Dept. of Commerce, 2011). Concerned about the

economic implications for RI of this digital divide amongst its citizens, the Rhode Island Economic Development Corporation (RIEDC) secured grant funds through the National Telecommunications & Information Administration (NTIA) to expand broadband infrastructure, access, digital literacy, and organizational capacity to ensure that Rhode Islanders, regardless of background or education, would have the opportunity to be full participants in the Digital Age (BBRI, 2012a).

It is important to start with a shared understanding of what the term "broadband" means. Broadband refers to a high-speed Internet service that is "always on" and has that capacity to deliver large amounts of computerized or digital content (such as text, pictures, video, music, etc.) over wired or wireless networks. According to a 2010 survey conducted by conducted by Princeton Survey Research Associates International, adoption of broadband internet access slowed in 2010. Two-thirds of American adults (66%) reported having broadband access at home, changing little from 63% with a high-speed home connection in 2009 (Pew Research Center, 2010). When individuals or families have broadband service, they can fully access a wealth of information, materials, and services available through the Internet – and in today's digital world, the amount of content and degree of dependency on Internet access is growing exponentially. Recently, Rhode Island ranked 19th in the nation in overall broadband adoption, and discrepancy exists, as described earlier, by race, ethnicity, and education level (BBRI, 2012a), as well as by presence of disability. There is some discrepancy in the data on broadband adoption for adults with disabilities. The National Telecommunications and Information Administration reports only 38% of persons with disabilities report being broadband adopters at home (NTIA, 2012). According to most current Pew Internet & American Life Project figures, 54% percent of adults living with a disability go online, compared with 81% of adults who report none of the disabilities listed (Pew Research Group, 2011). Adults with disabilities, however, clearly face greater barriers to broadband adoption than their non-disabled peers. In addition, the Pew Internet & American Life Project (2004) found that only 22% of American 65 years or older have access to the Internet. More recently, 53% of American adults age 65 and older use the internet or email. Although adults over 65 are less likely than all other age groups to use the internet, this data represents the first time that at least half of seniors are going online (Pew Research Group, 2012).

Considering these striking statistics, BBRI was determined to reach out to these Internet-underserved populations by developing strong digital literacy training components. While the full Broadband RI initiative addresses 1) infrastructure, 2) access, 3) digital literacy, and 4) organizational capacity, this article focuses specifically on the third component, the BBRI Digital Literacy Project.

Rhode Island Digital Literacy Project: The Start-Up

To address the need for increased and expanded digital literacy in Rhode Island, BBRI contracted with New Commons, a Pawtucket-based "think tank" specializing in progressive program design, development, and implementation. The first step in the process was to convene a state-wide group consisting of representatives from varied government, professional and community-based agencies to review broadband public policy, and, through the use of focus groups, develop recommendations for state-wide development. One of the first necessary system components for BBRI was the RI Digital Literacy Program. Start-up action steps for the RI Digital Literacy Program were identified: 1) an appropriate digital literacy curriculum, and 2) a train-the-trainers course. BBRI leadership reviewed several national digital literacy curriculum examples that had been designed for an adult population, but none of the existing examples were determined to be a good match for the needs of Rhode Islanders, as identified in the focus groups. Using components from several publically available curricula, BBRI developed an initial version of *Internet Basics Curriculum and Instructor's Manual* early in the fall of 2011. While digital literacy can follow many different paths, BBRI determined that the greatest community need was to learn how to effectively use the Internet, and four specific modules were designed to address this need:

Module 1: Internet, Browser, and Website Basics

Module 2: Internet Search Basics

Module 3: Internet Communication (Email Basics)

Module 4: Review and Capstone

The next step was to design and pilot an Instructor Workshop. With its expertise in program and training development, New Commons, together with BBRI leadership, designed and piloted the initial Instructor Workshop in October, 2011. Core components included:

- Program objectives
- 7 capabilities of a Trainer

- Practice on all curriculum modules
- Group feedback on all curriculum modules
- Dealing with challenging situations
- Group recommendations on the overall curriculum
- Conclusions and next steps

Participants in the pilot Instructor Workshop now familiar with the Internet Basics Curriculum and with the issues involved in conducting effective training, were ready to move forward to the next step of the project: Conducting community-based trainings.

Community-based DL Trainings: The First Wave

The first RI DL trainings took place in several public libraries (urban and suburban), and at an urban public housing authority site. Community participants were invited to take part in the sessions by the host sites, and basic registration information was gathered prior to the trainings, as well as information about each potential participant's prior experience with computers and the Internet. This information was shared with the DL trainers prior to each training series. For the sessions, trainers had access to desktop computers, Internet, digital projector & screen, separate training room, and the *Internet Basics Curriculum and Instructor's Manual, Version 1.* Trainers followed the four-module format, with one module conducted each week (for approximately 2 hours), and with some mid-week support sessions to offer practice opportunities for the pilot participants. Following the completion of the pilot trainings, a debriefing session was held in December, 2011, with the pilot session trainers. Summarized recommendations from this session, to update and improve the BBRI Instructor Workshop/DL course, are as follows:

- Be specific in the Instructor Workshop. Clarify training to best prepare instructors to work with people who have very limited experience with Internet, computers, or information technology.
- Make the first community Digital Literacy (DL) class at any site a "triage" class, to identify adult participants' learning needs and increase learner's vocabulary & concepts – especially if learners' basic computer skills cannot be screened earlier.
- Pair up instructors in the Instructor Workshop, and shorten training to 7 hours (one full day).

- Make each Instructor Workshop class size no more than 8 persons, to ensure sufficient time to practice, interact, and ask questions.
- Sequence Instructor Workshop components, moving from "lecture", to "practice" to "reporting out".
- Include briefing on how modules 1-4 sequence for optimal skill development and learning style recognition.
- Include practice scenarios on how to guide learners through each module.
- Replace module lectures with module role-playing, to better experience module instruction.
- Include exercises that reinforce learning techniques – i.e. repetition, analogy, team teaching.
- Address differing learning styles in Instructor Workshop. Focus on helping learners to learn "what", "how", and "why".
- Discuss room management – set-up, equipment, creating comfort, etc.
- Address what to do in difficult/challenging situations. Instructors should explore and share their knowledge about the target DL population.
- Identify and incorporate an approach that provides a means to support and teach DL students with different learning styles and needs.

At the RI Assistive Technology Conference held at the Crown Plaza Conference Center in Warwick, November 30, 2010, two members of the BBRI leadership team attended a content strand that focused on Universal Design for Learning (UDL) and how it can support learning for persons with widely varying needs. Following this experience and an investigation of the UDL approach, it was determined that UDL offered an appropriate and relevant framework for "rethinking" the DL curriculum and redesigning it to address greater learner variability, in order to give *all* individuals an equal opportunity to learn.

Universal Design for Learning (UDL)

UDL is a flexible structure of curriculum development that addresses learner variability (Hitchcock, Meyer, Rose, & Jackson, 2002). The Center for Applied Special Technology (CAST) first described the theory of Universal Design for Learning, or UDL, in the early 1990s (CAST, 1999). Based upon Vygotsky's concepts of how people learn, and on neuropsychological research, UDL core principles articulate how we learn through the

recognition, strategic, and affective neural networks (Rose & Strangman, 2007). These 3 core UDL principles for curriculum design are:

1. Multiple means of representation
2. Multiple means of action and expression
3. Multiple means of engagement

Based upon the results of feedback from the pilot DL sessions, BBRI identified UDL as the instructional framework that would best support the recommended changes in this DL curriculum and training project to better address the needs of diverse learners.

Note: A supportive component to the DL Project is the Digital Literacy Portal (BBRI, 2012c), a free, on-line public site through with all aspects of the project can be shared with the RI community, and where the community can sign up and receive information about the project. The *Internet Basics Curriculum*, the *Digital Literacy Instructor's Manual*, and many other resources are currently available, or will soon be posted on this site. The *Internet Basics Curriculum* is also available on the DL Portal in Spanish, offering increased accessibility of project materials. This portal was initiated in January of 2012 and serves as the dynamic and sustainable interface for the project. It is available at http://literacy.broadband.ri.gov/

Revising the DL Curriculum and the Instructor Workshop to be UDL

Based on pilot feedback and recommendations, BBRI and New Commons moved forward to revise the *Internet Basics Curriculum and Instructor's Manual* and the Train-the Trainer course. A consultant and specialist in UDL and curriculum development was added to the team, and specific action steps for integrating UDL into the project were determined.

UDL Step 1: Convert the curriculum manual from a "text-heavy" document to a more nimble, visually-accessible, easy-to-use document.

UDL Step 2: Integrate content on UDL, its core principles, and its role in supporting wide learner variability into the Instructor Workshop.

UDL Step 3: Design scenarios that represent the range of varied learners likely to participate in DL training.

UDL Step 4: Develop exemplary models, based on the UDL core principles and curriculum components as supports for scenario activities.

UDL Step 5: Integrate varied instructional methods (i.e. jigsaw readings, Demonstrate-Demonstrate-Practice-Prove strategy, analogies, simulations) to diversify the Instructor Workshop experience, and exemplify UDL in practice.

UDL Step 6: Gather and share ideas and resources, via the Digital Literacy Portal, to support trainers' continued diversification of instruction.

Revision of the pilot model took place primarily in December 2011 and January-February 2012, however it should be noted that while the revised *Internet Basics Curriculum and Instructor's Manual, Version 2,* is completed, the process of revision in the Instructor Workshop is ongoing, based on formative assessment gathered from the participants in Instructor Workshop (BBRI, 2012b).

Research Questions and Data Gathering Procedures

With the revised model and materials for DL Instructor training in process, relevant questions for the project to address are:

1. To what extent do DL trainers have knowledge of DL, UDL and other diverse support strategies prior to training?
2. How does participation in the Instructor Workshop change the level of DL, UDL and other relevant instructional knowledge and skills of the DL trainers?

Data gathering to answer the questions presented above was carried out through a pre & post assessment procedure. Questions were developed from the stated goals and objectives of the DL Instructors' curriculum and training protocol. The assessment consists of fourteen questions, with pre and post-test using identical questions. Examples from pre-post assessment are below:

Please circle the word that best indicates your current level of knowledge and/or skills in each of the following areas:

1. Adult learning needs and interests

Very Weak	Weak	Moderate	Strong	Very Strong

2. The seven capabilities associated with successful training

Very Weak	Weak	Moderate	Strong	Very Strong

3. Learner variation and Universal Design for Learning

Very Weak	Weak	Moderate	Strong	Very Strong

4. Purpose and need for more broadband access

Very Weak	Weak	Moderate	Strong	Very Strong

5. Team facilitation of instruction

Very Weak	Weak	Moderate	Strong	Very Strong

Using a summative scaling method, a Likert scale with values ranging from 1-5 was designed and used to assess each item. The specific scale used for each item is presented below:

1=Very weak 2=Weak 3=Moderate 4=Strong 5=Very strong

The complete list of pre and post-assessment questions is presented in Appendix I. The assessment tools were in a digitized format, and each trainer-in-training completed the pre-assessment before the start of each DL Instructor Workshop training session, and the post-assessment as their final task following completion of the DL Instructor Workshop training session. As of August 1, 2012, 67 community members had completed training in the UDL version of the DL Curriculum (Ver. 2).

Implementing Revisions

With the identification of the action steps needed to reframe the DL curriculum, using UDL as the guiding framework, specific implementation steps were carried out.

UDL Step 1: Curriculum manual changes. To address recommended changes in the curriculum manual for instructors, the following revisions were made:

1. *Module 0: Mouse and Keyboard Evaluation* was developed and included in the manual. This was in direct response to recommendations from pilot instructors that many participants needed to have these basic computer skills before they could benefit from instruction on Internet basics.

2. The size and scope of the content included in the first version of the manual was reduced, focusing just on essential content, as identified by the instructors. These core components are Internet, browser, website, search, and email basics.
3. The format of the manual was changed from solely text-based, to include pictures, graphics, outlines, and charts along with textual information. This adjustment is in keeping with the first UDL principle of multiple means of representation.
4. Color and differing font sizes are used to clarify and highlight key curriculum components
5. Lists of key terms are provided with each module
6. Presentation of content in each module was re-organized to follow the Demonstrate-Demonstrate-Practice-Prove/Show instructional model. First, the teacher demonstrates, next the student demonstrates, then the student practices, and finally the student proves competence by independently showing what they have learned.

UDL Step 2: UDL Integration. Content was developed covering the definition of UDL, UDL core principles, UDL implementation guidelines, graphic and interactive UDL resource, and practical examples of some possible UDL curriculum adjustments to address diverse learning needs. This content was integrated in the digital presentation developed for the Instructor Workshop sessions. The presentation is available to the trainers via the Digital Literacy Portal. Figure 1 below shows one example slide from the training presentation.

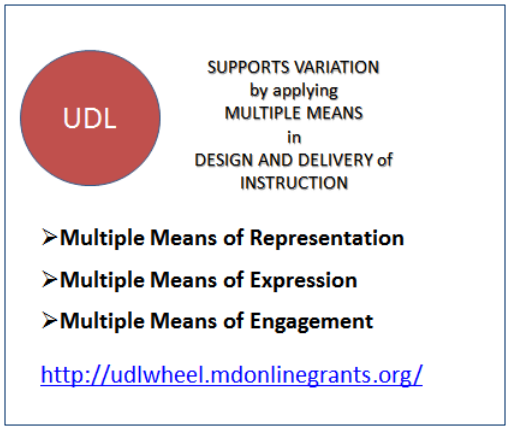

Figure 1

UDL Step 3: Simulation scenarios. Based upon feedback from pilot instructors and from data regarding target groups needing Internet access, different scenarios representing "challenging situations" that trainers could possibly confront in their community DL training sessions were

developed. Some scenarios involve students with differing access needs or disabilities; some involve students with different learning and/or behavioral styles; some involve students who speak different languages. Activities requiring consideration of these scenarios in the context of conducting DL training are built into the Instructor Workshop, and pairs of trainers work together to brainstorm ideas for handling these situations using UDL-inspired strategies and techniques. Below is an example of one of the scenarios form the training, and available on the BBRI DL Portal:

> "#1 An elder Digital Literacy learner has significantly impaired vision. This student cannot see projected materials, and cannot see the screen or the keyboard clearly. Consider how to plan to meet this student's individual needs." Background on the DL Instructor training program, including curriculum development, implementation, and outcomes, are presented. (BBRI, 2012c)

UDL Step 4: Examples of UDL Solutions. To help guide the trainers-in-training on ways that they could think about and identify different approaches and action to take when met with a challenging training situation, a chart was designed, adapted from original materials available from CAST, to help in identifying UDL solutions. Three areas of variation (methods, materials, and technology) are considered in developing solutions for the challenging situations, and these three areas are applied as the trainer considers the three UDL principles – 1) multiple means of representation; 2) multiple means of action and expression; and 3) multiple means of engagement (Figure 2). Trainers-in training, working in pairs, use the chart to consider their particular challenging students scenario, in the context of teaching a particular module of the curriculum, and develop ideas for different methods, materials, and/or technologies that might be used to help this student to have an accessible & successful learning experience.

Figure 2: Indentifying UDL Solutions

Task/Goal: _____

Student need:_____

Questions	**Potential Barriers**	**UDL Solutions** What methods, materials, or technology devices could be used to minimize the barriers and expand learning?		
		Represent?	**Express?**	**Engage?**
Methods What methods are used to achieve the task/goal?				
Materials What materials are used to achieve the task/goal?				
Technology What devices or programs are used to achieve this task/goal?				

Adapted from original "Deriving UDL Solutions" (CAST, 2003) by EM Dalton (2012) for the sole purposes of the Broadband RI Digital Literacy Training Curriculum

To help in understanding the implementation of this step, a completed sample exercise is included in Appendix II.

UDL Step 5: Diversify Instructor Workshop Instruction. From the time of the pilot, the DL Instructor Workshop has evolved in several ways:

- The training workshop was changed from 2 days to 1 day (a sample agenda from a DL Instructor training workshop is included in Appendix III).
- The Instructor Workshop class size was reduced from a maximum of twenty (20) participants to a maximum of eight (8) participants.
- All trainers complete an online self-assessment of their own digital literacy/adult education capabilities
- A brief multi-media introduction to the goals, project background, curriculum, and portal open each session
- Fundamental theoretical frameworks for the project, including a) the 7 critical instructor capabilities, b) action learning, c) social norm behavior, and d) UDL are discussed through interactive activities and a multi-media digital presentation.
- Curriculum modules are introduced and explored by the trainers through a jig-saw reading and discussion session, carried out first in pairs and then in group discussion.
- After the DL training staff "model teach" one of the modules, the 2-person trainer-teams read a module, discuss it, "model teach" it themselves to the group, and receive feedback from the group. Trainers are encouraged to use a "Demonstrate-Demonstrate-Practice-Prove" model for delivering instruction: 1) teacher demonstrates; 2) students demonstrate; 3) students practice; and 4) students prove their learning by applying it in a new context of their own choosing, for authentic application.
- Several exemplary analogies have been developed for use in the trainings. Analogies are used to connect the unfamiliar with the familiar, to support adult learning. Visuals are integrated in analogies to support differing learning styles. One example, *Internet = the Information highway*, is available on the BBRI Digital Literacy Portal at http://literacy.broadband.ri.gov/topic/1222/
- The challenging situations described in *UDL Step 3* are used to give trainers-in-training further practice in teaching the DL curriculum under authentic conditions. During the afternoon training, pairs of trainers teach the same module that they did in the morning, but this time a "challenging situation" occurs that they need to handle as they are teaching the module. The training pair knows ahead of time what the nature of the

challenging situation will be before it happens, so that they can think through and prepare ways to address the "challenger's" needs. This simulation in context helps trainers to work through making adjustments and accommodations as they are teaching the content.

UDL Step 6: Sharing ideas and resources. To support instructors' ongoing collaboration and diversification of instruction, the public access BBRI Digital Literacy Portal offers access to many resources. Portal categories and current content are below. Content for the DL Portal is dynamic and is consistently growing, and the portal will serve as a sustaining resource for the initiative when federal funding supports are no longer available.

On the BBRI Digital Literacy Portal, as of August 1, 2012, the following information has been posted to the site:

- HOME
  - Program overview
  - Google map of digital literacy resources (interactive)
  - Information on target audiences
  - Contact us
  - Information on the Program's Learning Framework
  - Project Dashboard (password required)
- CLASSES & EVENTS
  - Public classes
  - Instructor Workshops
  - Community forums
- CLASS RESOURCES
  - Internet basics curriculum
  - Free online teaching materials
  - Tips & techniques for instructors
  - Ideas for challenging class situations
  - DL Participant self-assessment tool
- INSTRUCTORS
  - Available instructors
  - How to become an instructor
- CLASS LOCATIONS
  - Available class locations
  - How to add a new class location
- COMMUNITY PARTNERS
  - Active partners
  - Become a partner

- Student recruitment resources
- Related programs and initiatives

All trainers are encouraged to visit and use the portal frequently, to connect with their colleagues through the Tips & Techniques Forum, and to share ideas and resources in the forum with other instructors in the DL program for continued program development and growth.

Instructor Workshop Results

Sixty-seven volunteer instructors have, as of August 1, 2012, completed the BBRI training and are now ready to use the DL curriculum to deliver DL training at no charge to the Rhode Island community. Each instructor participated in pre and post assessment of their knowledge and skills (self-assessment) as part of the training sessions. Results from the pre and post assessments are displayed below (Fig. 3):

Figure 3: Sum average results of BBRI DL instructor workshop pre and post assessments
N=67

Curriculum Content Goal	Pre-assessment	Post-assessment	Degree of change
Adult learning	3.5	4.1	+0.6
Learner variation & UDL	2.5	3.8	+1.3
Broadband access	3.6	4.1	+0.5
Team facilitation	3.3	4.2	+0.9
Online resources	3.5	4.2	+0.7
Online searching	3.8	4.3	+0.5
Search engines	3.9	4.4	+0.5
Email functions	3.9	4.3	+0.4
Student project	3.5	4.2	+0.7
Physical access	2.7	3.6	+0.9
Learning access	2.6	3.6	+1.0
Communication access	2.4	3.4	+1.0
Scheduling DL sessions	2.6	3.9	+1.3

Finding tools & resources	3.0	4.0	+1.0
TOTAL SUM AVERAGE	**3.2**	**4.0**	**+0.8**

Discussion

There are three major components that impact the improvement of delivery of essential public services through the Internet (Fig. 4): Network capacity; e-government; and digital citizens (BBRI, 2012a).

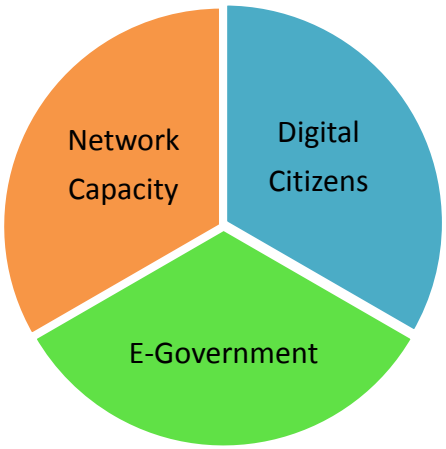

Fig. 4: Components necessary to achieve Internet delivery of public services

Each component is a necessary "spoke in the wheel", for if one component is lacking, the success of broadband adoption across our citizenship will be in doubt. Establishing network capacity requires a solid infrastructure that connects to all sources of public information easily and quickly. Developing e-government requires all government services to be on the web and that Internet services are efficient, responsive, and operate transparently to the public. Enabling a digital citizenry requires public access to the Internet, affordable access for low-income households, and provision of digital literacy education to all who need it. As the world moves constantly toward the use of digital information, persons without access and knowledge of the Internet will be increasingly disadvantaged – educationally, socially, and economically.

The Digital Literacy Project, a component of the larger BBRI initiative, seeks to address some of the needs within the third "spoke" of digital citizens, namely developing and providing training; first, to volunteer trainers, who want to build their skills and knowledge about Internet

access and use; next, to the citizenry of RI who are not yet digitally literate, through the work of the volunteer trainers. The pre and post assessment data (Fig. 3) offers insight on the first part of this process, the training of DL instructors. This same data is presented below in a functional summarized view of all instructors' self-identified levels of knowledge and skills (DL K & S) relating to the digital literacy curriculum objectives (Fig. 5):

Figure 5: Trainers' self-identified knowledge and skills re: BBRI DL objectives

Pre-assessment		**Post-assessment**	
Very Weak = None		Very Weak = None	
Weak =	Learner variation & UDL	Weak =	None
	Physical access		
	Learning access	Moderate =	Learner variation & UDL
	Communication access		Physical access
	Scheduling DL sessions		Learning access
	Finding tools & resources		Communication access
			Scheduling DL sessions
Moderate =	Adult learning		Finding tools & resources
	Broadband access		
	Team facilitation	Strong =	Adult learning
	Online resources		Broadband access
	Online searching		Team facilitation
	Search engines		Online resources
	Email functions		Online searching
	Student project		Search engines
			Email functions
Strong =	None		Student project
Very Strong=	None	Very Strong=	None

Question 1: To what extent do DL trainers have knowledge of DL, UDL and other diverse support strategies prior to training

Results from the pre-assessment show the average responses by instructors-in-training, when asked to self-assess their own levels of DL-related knowledge and skills ranged from a value of 2.4 (Weak) to 3.9 (High moderate). The mean of all pre-assessment responses was 3.2 (Moderate).

When the results are viewed functionally, the data shows that, on average, none of the instructors initially self-identified as Very Weak in any of the fourteen content areas covered in the DL curriculum and training. Instructors' responses of Weak clustered in areas relating to working with more diverse populations (including persons with disabilities) and knowing how to schedule training sessions and find tools & resources in the future. In the pre-assessment,

instructors, on average, identified their knowledge and skills at a Moderate level in areas relating to adult learning, team facilitation, and areas specific to broadband and Internet use. Pre-assessment results indicated no areas that were self-identified as either Strong or Very Strong.

In considering these results, it is apparent that volunteer instructors in the BBRI DL Program already come with some knowledge and skill in digital literacy training. From background information available about the instructors, many are working or have worked in positions that deal with online information (such as librarians, business persons, etc.), and therefore have an understanding of this aspect of the curriculum. What is also apparent is the fact that the instructors feel much less confident in areas relating to accessibility and knowing how to accommodate and support persons with differing needs and learning styles. This is an important realization for the project, and for digital literacy as a whole, because persons with disabilities, persons for whom English is not their first language, persons with differing learning styles, and seniors who have differing needs comprise a significant portion of the non-digitally literate population. It is important that any DL program works to address the needs of these students by ensuring that those who will teach DL are prepared to support diverse populations.

Questions 2: How does participation in the Instructor Workshop change the level of DL, UDL and other relevant instructional knowledge and skills of the DL trainers?

Results from the post-assessment, administered at the end of each 7.5 hour training session, indicate average responses by the instructors-in-training ranged from a value of 3.4 (Moderate) to 4.4 (Strong). The mean of all post-assessment responses was 4.0 (Strong). The degree of change between instructors' self-assessed levels of knowledge and skill in the DL content areas ranged from +0.4 to +1.3, with a mean degree of change equaling +0.8, or close to one complete level of confidence.

Functionally, post-assessment data shows improvement in instructors' personal levels of confidence in their DL knowledge and skills in each of the fourteen curriculum areas following their participation in training. None of the instructors' scores, on average, in the post-assessment, were identified at either Very Weak or Weak levels, following training. Areas identified as Weak in the pre-assessment had improved to a Moderate confidence level (working with diverse populations, persons with disabilities, knowing how to schedule training sessions and how to find tools & resources). Areas identifies at a Moderate level in the pre-assessment

had improved to a Strong confidence level (adult learning, team facilitation, and areas specific to broadband and Internet use). Results did not indicate any areas at a Very Strong confidence level.

The results of this study clearly show that significant change can and does occur in instructors' levels of knowledge and skill and in their personal instructional confidence levels when they participate in structured, interactive, diversified training in how to teach a digital literacy curriculum. In this project, sixty-seven instructors took part in one-day training workshops that introduced them to the BBRI DL curriculum, provided instruction on learner variability and Universal Design for Learning, guided their practice in the presentation of curriculum modules, offered hands-on opportunities to learn about challenging training situations, and introduced assistive technology, online, and other resources to support effective DL instruction. In every curriculum content area, gains in knowledge and skills of trainers were demonstrated. Greatest gains in learning (more than +1.0) were made in areas that had been identified as weakest in pre-assessment – namely learner variation and UDL, learning access, communication access, scheduling DL sessions, and finding tools and resources. The content areas of physical access & team facilitation also showed nearly a one point gain (+0.9) in instructor confidence.

Pre-assessment results revealed that instructors felt less confident in content areas that deal with accessibility and planning to effectively support learners with differing learning styles, approaches, and needs. Through the training, instructors' confidence in these areas grew, and, on average, each instructor felt *moderately confident* and prepared to work effectively with persons from non-traditional backgrounds and who may have widely varying learning and access needs. This is a significant result, since the likelihood of non-traditional students and those with differing needs being part of any community-based digital literacy class is high. Across the United States (and around the world), digital literacy is an ever-growing requirement for participation in modern society. Those who do not have access to digital resources or do not know how to use them will be at significant disadvantage. Studies have shown that current digital non-users primarily include persons of low income, persons who speak English as a second language, persons with differing learning needs and/or disabilities, and persons who are elders. All are target populations for digital literacy training, and all are likely to have diverse

learning needs. It is important that digital literacy training programs appropriately plan for and address this societal reality.

Recommendations

The BBRI initiative has learned much through its efforts to expand digital access across the RI community. Results of the DL Instructor Workshop can provide informed guidance to other broadband projects that seek to develop DL training programs that will effectively reach the populations who need training the most. From the experiences described in this article, and the data represented, the following recommendations are made:

1. Recognize diversity as the norm. Identify and follow an instructional approach, such as UDL, when designing a DL curriculum that plans for learner variation.
2. Design curriculum tools to exemplify your diverse learning approach. For example, the BBRI DL Program completely revised its *Internet Basics Curriculum and Instructor's Manual* to be visually-based and to include clear instructional strategies, based on UDL, to reduce inherent barriers in the earlier print-based curriculum.
3. Include specific content and activities that expose trainers to information and practice in how to support diverse learners.
4. Lead by example. Integrate diversified training experiences into the DL curriculum and model them first – and then have others try them out.
5. Develop an online resource presence. Following training, instructors will need access to information and resources, and they will need a way to keep in touch with each other. This is needed for the sustainability of any DL program. Community ownership of digital literacy for all is the ultimate goal.

Postscript: Stories of Two Students, and One Digital Literacy Class

At approximately 4:30 pm, seven students arrive at the computer lab of an urban charter school, the site of one of the BBRI DL community trainings offer during Spring 2012. Students represent varied racial, ethnic, and cultural backgrounds. This is the fourth and final module of the DL training, the module involving students' review of concepts and skills learned, and then the application of these to something unique that they want to accomplish.

The instructor, who is bilingual (Spanish/English), begins class with several questions posed to the students: Why did you want to participate in this class? Did you learn what you wanted to learn? What else would you like to learn about? Conversation ensues and students share some of their views with the instructor. The instructor proceeds to review some of the major concepts covered in the course: Browsers, configuration, navigation. A concern is shared that different computers in the lab have different versions of the Internet access program, Explorer, which have differing features. This is problematic, since the teacher will be demonstrating on a screen that does not look like the screens that some of the students are using, and this can be confusing to the students. Despite this problem, the class moves forward and students work on accessing the Internet to accomplish tasks of their own choosing – accessing state government information (Department of Transportation, AskRI.org, etc.). Smiles occur when the searches finally make sense and the students can do the searches they wanted to do on their own. Two students shared their individual stories:

> "Maria" is a single parent and is primarily Spanish-speaking. She had never used a computer before attending this DL class. She wants to learn everything about the computer. She says "I'm starting to learn. I can use things to search. I want to communicate with my family in Cape Verde. I read more than I write – now, I work with the computer. I ask my son to help me." She is asked if there is more that she wants to learn from the class. Maria responds, "More? For now I don't ask for more – I'm just in Kindergarten." She continues to share her story – "I sacrifice this time – normally I am working. When I am home, I will use the computer with my son. I like this class."
>
> "Erick" is originally from Nigeria and is chaplain for a local church. He joined this DL class to learn more about the computer. He shares, "We live in a new technology time. Everything change now. We can shop at home. I try to get knowledge and educate my kids." Erick is asked if he learned what he wanted to learn from the class. He responds, "I learned some things. I knew some things before. I came to learn Excel, but this is not what we are learning here." When asked what else he wants to learn, Erick responds "If the computer has a problem, I'd like to learn more about computers. I'd like to learn how to do flyers." Finally, when asked what new things he had learned, he responded enthusiastically, "Make pages smaller and bigger. Different ways to navigate with arrows and scroller. Select and copy and paste. Making new tabs. Making new tool bars."

Two students, differing in backgrounds and in initial knowledge of computers, but both highly motivated to learn. These students represent only two of the thousands and thousands of individuals whose lives can benefit from, and can be changed by becoming digitally literate citizens. BBRI's Digital Literacy Program is designed to recognize diversity as our community's natural state. Its curriculum and instructor training program incorporate the approaches, materials, and resources needed to reach this diverse student population**.** Universal Design for Learning (UDL) serves as the underlying framework for the BBRI DL curriculum and training. Information and materials are available to the public through the BBRI Digital Literacy Portal at http://literacy.broadband.ri.gov/

The BBRI Digital Literacy Program invites others to explore and use the materials developed through this project, and to collaborate with us to help expand digital literacy instruction to reach all who need and want it.

References

Broadband Rhode Island (2012a). Broadband Policy for Rhode Island: Achieving Competitive Advantage on the Internet Age. Executive Report. Providence, RI: RI Economic Development Corporation.

Broadband Rhode Island (2012b). Internet Basics Curriculum and Instructor's Manual (Ver. 2). BBRI Digital Literacy Program. Providence, RI: RI Economic Development Corporation.

Broadband Rhode Island (2012c). Digital Literacy Portal. BBRI Digital Literacy Program. Providence, RI: RI Economic Development Corporation. Available at http://literacy.broadband.ri.gov/

CAST. (1999). UDL Principles. Retrieved March 3, 2012, from http://www.cast.org/research/udl/.

Hitchcock, C., Meyer, A., Rose, D., & Jackson, R. (2002). Technical brief: Access, participation, and progress in the general curriculum. Peabody, MA: National Center on Accessing the General Curriculum. Retrieved May 20, 2012, from http://www.cast.org/ncac/index.cfm?i=2830

National Telecommunications and Information Administration (2012). Digital literacy: American with Disabilities Act News. U.S. Department of Commerce. Retrieved June 3, 2012 at http://www.digitalliteracy.gov/content/americans-disabilities-act

Pew Internet & American Life Project (2004). Older Americans and the Internet. Executive report on computer literacy for seniors. Retrieved June 3, 2012 at http://www.pewinternet.org/Reports/2005/The-Internet-and-Campaign-2004.aspx

Pew Research Group (2012). Older adults and internet use. Retrieved July 30, 2012 at http://pewinternet.org/Reports/2012/Older-adults-and-internet-use.aspx

Pew Research Center (2011). Americans living with disability and their technology profile. Retrieved July 31, 2012 at http://pewinternet.org/Reports/2011/Disability.aspx

Pew Research Center (2010). Home Broadband 2010: Summary of Findings. Retrieved July 30, 2012 at http://pewinternet.org/Reports/2010/Home-Broadband-2010/Summary-of-Findings.aspx

Rose, D., & Strangman, N. (2007). Cognition and learning: Meeting the challenge of individual differences through a neurological perspective. *Universal Access in the Information Society, 5*(4), 381-391.

U.S. Dept of Commerce (2011). Digital Nation: Expanding Internet Usage. Washington, DC: National Telecommunications and Information Administration.

Appendix I: Pre and Post-assessment Questions

BBRI Digital Literacy Training
Training of Trainers
Pre-assessment/Post-assessment

Please circle the word that best indicates your current level of knowledge and/or skills in each of the following areas:

1. Adult learning needs and interests

Very Weak Weak Moderate Strong Very Strong

2. The seven capabilities associated with successful training

Very Weak Weak Moderate Strong Very Strong

3. Learner variation and Universal Design for Learning

Very Weak Weak Moderate Strong Very Strong

4. Purpose and need for more broadband access

Very Weak Weak Moderate Strong Very Strong

6. Team facilitation of instruction

Very Weak Weak Moderate Strong Very Strong

7. Identification of relevant online resources for adults

Very Weak Weak Moderate Strong Very Strong

8. Basic concepts and skills critical to initiate digital literacy and online use

Very Weak Weak Moderate Strong Very Strong

9. How to use search engines to find various types of information

Very Weak Weak Moderate Strong Very Strong

10. How to use email and the various email functions

Very Weak Weak Moderate Strong Very Strong

11. How to support students with differing physical needs (limited motion, hearing, vision, etc.)

Very Weak Weak Moderate Strong Very Strong

12. How to support students with differing learning needs (reading problems, learning disabilities, etc.)

Very Weak Weak Moderate Strong Very Strong

13. How to support students with differing communication needs (ELL, deaf, Asperger's, autism, etc.)

Very Weak Weak Moderate Strong Very Strong

14. How to schedule and organize digital literacy training at your site

Very Weak Weak Moderate Strong Very Strong

15. Materials & equipment necessary for DL training, and how to get them

Very Weak Weak Moderate Strong Very Strong